**ANSWERS: Solubility constant**

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| **PbCl2**  *K*s(PbC12) = 1.70 × 10–5  PbCl2(*s*) **⇌** Pb2+(*aq*) + 2Cl–(*aq*)  *K*s = [Pb2+][Cl–]2  [Pb2+] = *x* [Cl–] = 2*x*  *K*s = 4*x*3    [Pb2+] = 1.62 × 10–2 mol L–1  [Cl–] = 3.24 × 10–2 mol L–1 | **FeS**  *K*s(FeS) = 4.90  10–18  FeS sm eq arrow Fe2+ + S2-  Ks = [Fe2+] [S2-]  Ks = [s] [s]  4.90  10–18 = s times s  4.90  10–18 = s2  √4.90  10–18 = s  2.21359 x 10-9 = s  Answer: 2.21 x 10-9 mol L-1 | **Fe(OH)2**  *K*s = 4.10 × 10–15  Fe(OH)2(*s*) sm eq arrow Fe2+(*aq*) + 2OH–(*aq*)  *K*s = [Fe2+] [OH–]2  [Fe2+] = *s*  [OH–] = 2*s*  *K*s = *s* × (2*s*)2  4.10 × 10–15 = 4*s*3  *s* = 1.01 × 10–5 mol L–1  Answer = 1.01 × 10–5 mol L–1 | **Zn(OH)2**  *K*s = 3.00 × 10–17  Zn(OH)2*(s)* sm eq arrow Zn2+(*aq*) + 2OH–(*aq*)  *K*s = [Zn2+][OH–]2 |

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| **Ag2CrO4**  *K*s(Ag2CrO4) = 3.00 × 10–12  Ag2CrO4(*s*) sm eq arrow 2Ag+(*aq*) + CrO42–(*aq*)  *K*s = [Ag+]2[CrO42–]  *K*s = (2*s*)2(*s*) = 4*s*3  *s* =  *s* = 9.09 × 10–5 mol L–1 | **AgCl**  *K*s (AgCl) = 1.56 × 10–10  **AgCl** sm eq arrow **Ag+(aq) + Cl-(aq)**  *K*s = [Ag+][Cl–]  = 1.56 × 10–10 = *s*2  *s* = 1.25 × 10–5  [Ag+] = 1.25 × 10–5 (mol L–1) | **PbCl2**  *K*s(PbCl2) = 1.60 × 10–5  PbCl2(*s*) Pb2+(*aq*) + 2Cl–(*aq*)  *K*s(PbCl2) = [Pb2+] [Cl–]2  *K*s = *s* (2*s*)2  1.60 × 10–5 = 4*s*3  *s* = 0.0159 mol L–1  solubility of PbCl2(*s*) **=** 0.0159 mol L–1 |

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| **Mg(OH)2**  *K*s(Mg(OH)2) = 1.25 × 10–11  Mg(OH)2(*s*) :Double arrow.eps Mg2+(*aq*) + 2OH–(*aq*)  *K*s = 4s3 = 1.25 × 10–11  s3 = 3.125 × 10–12  s = 1.46 × 10–4  solubility is 1.46 × 10–4 mol L–1 | **CaSO4**  *K*s (CaSO4) = 2.45 × 10–5  CaSO4(s) :Double arrow.eps Ca2+(*aq*) + SO42–(*aq*)  Reverse eqn also acceptable.  *Subscripts not required but penalise CaSO4(aq).*  *K*s (CaSO4) = [Ca2+][SO42–] = 2.45 × 10–5  S = √ (2.45 × 10–5) = 4.95 × 10–3 mol L–1 | **PbF2**  *Ks* = 3.7 x 10–8  PbF2 (s) :Double arrow.epsPb2+ (aq) + 2F– (aq)  Ks = [Pb2+][F–]2  [Pb2+] = s then *Ks* = 4s3  s= 1⁄4(3.7 x 10–8  **s =** 2.10 x 10–3 mol L–1 = [Pb2+] |

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| **1)** *K*s = [Ag+]2[CrO42–] | **2)** *K*s = [Ag+][Cl–]  1.56 × 10–10 = [0.100][Cl–]  [Cl–] = 1.56 × 10–9    *n* = *c* × *V*  = 1.56 × 10–9 × 5.00 mol  = 7.80 × 10–9 mol  *m* = *n* × *M*  = 7.80 × 10–9 mol × 58.5 g mol–1  **=** 4.56 × 10–7 g |
| **4) a)** Solubility is the amount of substance that will dissolve in a given volume to form a saturated solution (at that temperature).   |  |  | | --- | --- | | **b)** | **c)** | | |

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